

# National Transportation Safety Board

Office of Highway Safety

Washington, DC 20594



HWY23MH017

## **UNMANNED AIRCRAFT SYSTEM AERIAL IMAGERY**

Group Chair's Factual Report

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## **A. CRASH**

Location: Teutopolis, Effingham County, Illinois  
Date: September 29, 2023  
Time: 8:41 p.m. CDT

## **B. UNMANNED AIRCRAFT SYSTEM AERIAL IMAGERY GROUP**

UAS RPIC Eric Gregson  
National Transportation Safety Board  
Washington D.C.

## **C. CRASH SUMMARY**

For a summary of the crash, refer to the *Crash Information and Summary Report*, which can be found in the NTSB docket for this investigation.

## **D. DETAILS OF THE INVESTIGATION**

### **1.0 Equipment**

Mapping and imagery flights were conducted on October 1<sup>st</sup> and October 3<sup>rd</sup>, 2023, using the NTSB DJI Phantom 4 Professional V2. The sUAS<sup>1</sup> is equipped with a dual GPS/GLONASS receiver which provides geo-referenced information encoded in all still photographs. The sUAS is equipped with an FC6310 camera using the Sony Exmor 1-inch CMOS sensor, with a focal length of 8.8 mm. Still photograph resolution is 20 megapixels in JPG or RAW format.

### **2.0 Procedures**

Four missions were conducted utilizing the sUAS. The first two missions captured the crash scene and surrounding roadway and area. The third mission was to capture the damaged vegetation area caused by the dispersal of the anhydrous ammonia. The last mission was flown to capture the involved tanker.

The crash was located westbound United States Route 40. The GPS latitude and longitude coordinates were 39°08.4443' N, -88°26.3464' W. The crash was in Class G uncontrolled airspace with no active advisories or temporary flight restrictions in place.<sup>2</sup> The nearest public airport was Alton/St Louis Airport (KALN), which was located 93 miles southwest of the crash scene.<sup>3</sup>

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<sup>1</sup> sUAS - small Unmanned Aerial System

<sup>2</sup> FAA B4UFLy

<sup>3</sup> <https://airnav.com>

There were trees located in the vicinity of the crash scene, but no significant terrain, environmental, or obstruction hazards. The flights were conducted under *Code of Federal Regulations Part 107*.

To obtain aerial imagery for the use of creating an orthomosaic image of the crash scene and surrounding roadway, the sUAS was flown over the collision site while traffic control was provided by the Illinois Department of Transportation (IDOT). IDOT closed the roadway to all vehicular traffic so no vehicular traffic was present underneath the sUAS. On October 2, 2023, two flights at the scene were conducted utilizing Pix4D Capture using a double grid pattern at approximately 150 feet above ground level (AGL). A total of 348 aerial images and 1 scene video were captured of the crash site. During all flights a visual observer (VO) was used and the sUAS was not flown over moving vehicles.

On October 3, 2023, a third mapping mission was requested by NTSB Hazardous Materials investigators. The request was to map the area of vegetation that had been affected by the release of the anhydrous ammonia. Approximately 117 acres was mapped resulting in 993 aerial photographs obtained. The fourth mission was flown to document the tanker involved in the crash. Approximately 111 aerial photographs were obtained at varying heights. Figure 1 is an aerial image taken above the crash scene looking southeast.



**Figure 1.** Aerial image of US Route 40 looking southeast.

### **3.0 Processing**

The sUAS was used to capture 348 high resolution, georeferenced photographs of the crash scene suitable for processing in the Pix4D photogrammetry software.<sup>4</sup> An additional 99 perspective photographs were taken of an overview of the crash location and were not included in the photogrammetry processing. Figure 2 is a nadir view of the three-dimensional point cloud generated from the images.

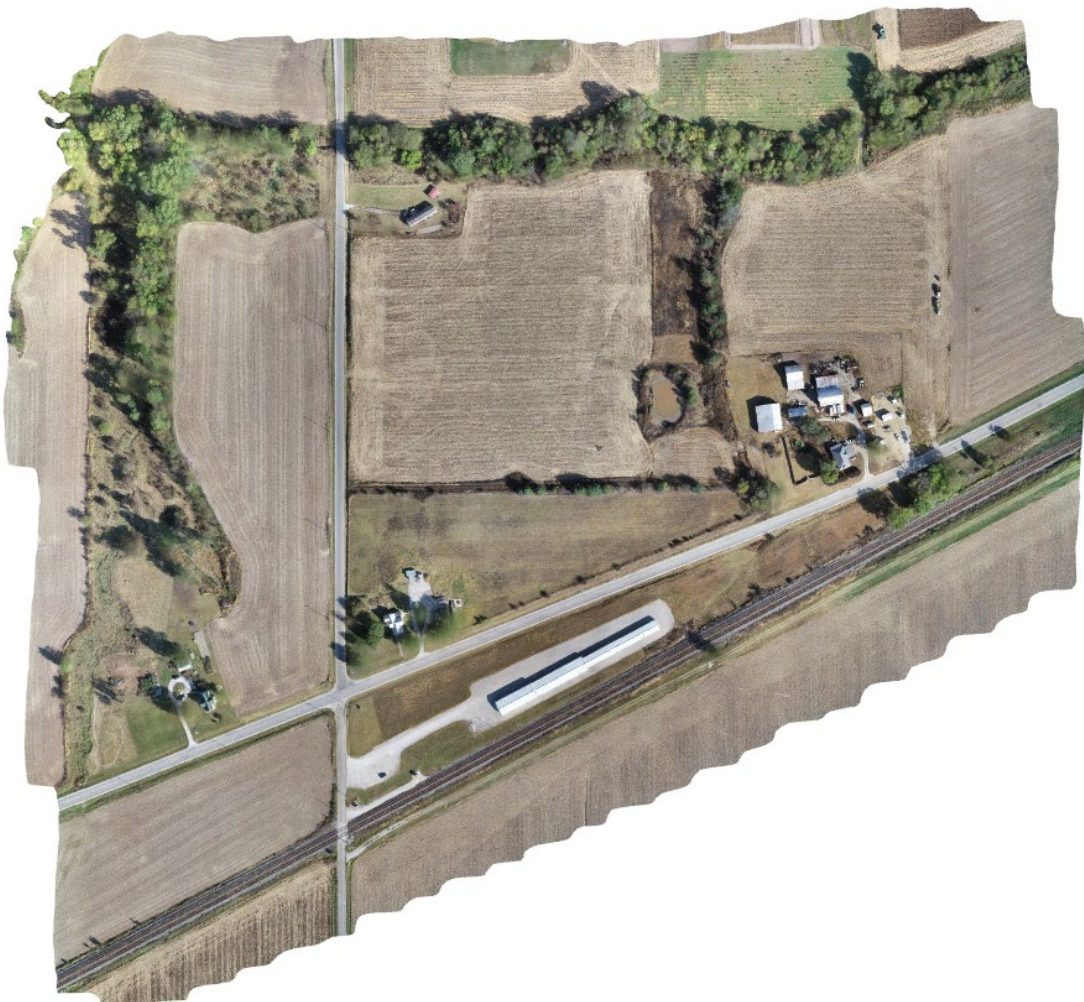
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<sup>4</sup> Pix4DMapper is a photogrammetry software package designed to use overlapping photographic images to generate 3D point clouds. Additional outputs can be generated through additional processing, including 3D models and an 2D orthomosaic image.



**Figure 2.** Image of the generated point cloud of the crash scene.

The sUAS was used to capture 993 high resolution georeferenced photographs of the field adjacent to the area of the crash and release of the anhydrous ammonia, suitable for processing in the Pix4D photogrammetry software. The resulting point cloud of the area can be seen in Figure 3.



**Figure 3.** Nadir view of the area of vegetation affected by the release of anhydrous ammonia.

Finally, the sUAS was utilized to capture aerial images of the tanker involved in the crash. There were 111 georeferenced photographs captured that was suitable for processing in the Pix4D photogrammetry software. Figure 4 is an aerial image of the tanker involved in the crash. Figure 5 below is an image of the generated three-dimensional point cloud of the tanker trailer.



**Figure 4.** Aerial image of the tanker involved in the crash.



**Figure 5.** Image of the generated three-dimensional point cloud of the involved tanker trailer.

Submitted by:

Eric Gregson  
sUAS Aerial Imagery Specialist/RPIC